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ABSTRACT

Four preschool children with developmental delays were taught to name the numerical value of sets of geometric figures, the corresponding numeral, the corresponding number word, and the corresponding Roman numeral. Half of the stimuli were taught with instructive feedback and the other half without, as two conditions were established: the future condition which included the presentation of future-targeted behaviors during the consequent events for correct responses (i.e., the use of instructive feedback), and the nonfuture condition, which did not include instructive feedback. For example, when numerals were taught directly, instructive feedback (in the form of embedding number words in feedback) was used with half of the numerals but not with the other half. Findings included: (1) the presentation of instructive feedback in the future condition did not interfere with acquisition of target behaviors; (2) constant time delay resulted in three of the four students learning to name the numerical value of sets of geometric figures, the corresponding numeral, and the corresponding number word; (3) teacher direct instruction time required was greater for the nonfuture conditions; and (4) the addition of instructive feedback in the consequent event resulted in more rapid acquisition of those behaviors when they were subsequently instructed. (JDD)

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Effects of Instructive Feedback on the Efficiency of Future Learning[1]

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Studies of instructive feedback have shown that simply the presentation of additional stimuli in the consequent events will result in students acquiring some of those stimuli without direct instruction in the traditional sense (Gast, Doyle, Wolery, Ault, & Baklarz, 1991). For example, it has been used to teach students to spell sight words that they are taught to read (Gast et al., 1991), to classify stimuli on some conceptual dimension (Wolery, Holcombe, Werts, & Cipolloni, in press), to define words that they are taught to read (Shelton, Gast, Wolery, & Winterling, 1991), and to state additional factual information related to the response being taught directly (Wolery, Cybriwsky, Gast, & Boyle-Gast, 1991).

Two recent investigations have suggested that the use of instructive feedback may increase the rapidity with which skills are learned when they are later taught directly. Wolery, Doyle, Ault, Gast, Meyer, and Stinson (1991) used progressive time delay in a one-to-one arrangement to teach elementary-aged students with moderate mental retardation to name two sets of photographs. For one set, the students were simply taught to name the photograph and the consequence for correct naming was praise. For the second set of photographs, the consequences involved praise and presentation of a written word for the object depicted in the photograph (i.e., instructive feedback). After students met criterion on both sets of photographs, the children were taught to read the words of the objects depicted in both sets. The results indicated that the use of instructive feedback (showing the written word during photograph training) resulted in more rapid learning when the students were taught to read the words directly.

In a similar study, Holcombe, Wolery, Werts, and Hrenkevich (1992) taught preschool children in a small group arrangement with constant time delay to label two sets of numerals. In one condition, the consequent events were praise and tokens. In the

second condition, instructive-feedback condition, the consequent events were praise, tokens, and presentation of the number word that corresponded to the numeral being taught directly. After children met criterion on both sets of numerals, they were taught directly to read the number words that corresponded to the numerals. Again, the results indicated that the number words that had been presented through instructive feedback were learned more rapidly than those that had not been presented (i.e., they required 18% less instructional time to meet criterion).

In both of these studies (Holcombe et al., 1992; Wolery, Doyle, et al., 1991), an adapted alternating treatment design (Sindelar, Rosenberg, & Wilson, 1985) was used. This design is limited by the fact that only one opportunity existed to evaluate the effects of the instructive feedback. However, given the savings of instructional time found in these studies, the question becomes: "What effects would occur if students experienced instructive feedback on multiple sets of sequentially taught behaviors?" The current investigation was designed to answer this question.

Four preschoolers attending a half-day preschool program for children with developmental delays participated in this study. All children had no previous experience with direct instructional procedures. The four children were divided into two dyads for instruction. Initially, students were screened on their ability to name four stimulus variations: (a) the numerical value of sets of geometric figures, (b) the corresponding numeral, (c) the corresponding number word, and (d) the corresponding Roman numeral. Four sets and corresponding numerals, number words, and Roman numerals were selected for each student. The sets were matched on stimulus characteristics, and counterbalanced across two conditions, referred to as future and nonfuture. Each student in the dyad had unique stimuli. Half of each stimulus variation (e.g., half of the sets) were taught with

instructive feedback (i.e., embedding the corresponding numeral in the consequent events for correct responses to number sets), and the other half was taught without instructive feedback. Further, when numerals were taught directly, instructive feedback (embedding number words in the consequent events for correct responses) was used with half of the numerals but not with the other half. Similarly, when number words were taught directly, instructive feedback (embedding Roman numerals in the consequent events for correct responses) was used with half of the number words but not with the other half. We evaluated the effects of these arrangements on the number of children who met criterion on each group of behaviors taught, and the efficiency of that instruction (i.e., number of sessions, number of minutes of instruction, and number and percent of errors to criterion).

The future condition involved (a) direct instruction with a 3-second constant time delay procedure in naming sets and presentation of the corresponding numeral as instructive feedback for correct responses until the student demonstrated criterion level responding on sets, (b) direct instruction with a 3-second constant time delay procedure in naming the numerals (corresponding to the sets previously taught) and presentation of the corresponding number word as instructive feedback for correct responses until the student demonstrated criterion level responding on naming numerals, and (c) direct instruction with a 3-second constant time delay procedure in reading the number words (corresponding to the numerals previously taught) and presentation of the corresponding Roman numeral as instructive feedback for correct responses on the number word.

The nonfuture condition involved (a) direct instruction using a 3-second constant time delay procedure in naming sets, (b) after establishing criterion level performance, direct instruction with a 3-second constant time delay procedure in naming the corresponding numerals, and (c) after establishing criterion level performance, direct

instruction with a 3-second constant time delay procedure in reading the corresponding number words. The two conditions were identical with the exception of the presentation of the future targeted behaviors during the consequent events for correct responses in the future condition (i.e., the use of instructive feedback).

Based on the results, several findings are presented. First, the presentation of instructive feedback in the future condition did not interfere with acquisition of target behaviors. This is similar to findings of previous research (Holcombe et al., 1992; Wolery, Doyle, et al., 1991). With naming numerals and naming number words, the future condition required fewer trials and percent of errors than the nonfuture condition.

Second, constant time delay resulted in three of the four students learning to name the numerical value of sets of geometric figures, the corresponding numeral, and the corresponding number word. For the fourth student, Jared, the procedure was effective in the acquisition of naming the numerical value of sets of geometric figures in the future condition. Jared exhibited noncompliant and inappropriate behaviors throughout training which interfered with instruction. He was removed from four instructional sessions as a result of tantrums.

Third, teacher direct instruction time required was greater for the nonfuture condition. Nonfuture instruction resulted in 21 additional minutes and the acquisition of 4 less behaviors for Group A, and 38 additional minutes and the acquisition of 4 less behaviors in Group B. For Group A, four future behaviors were taught in approximately the same amount of time as three nonfuture behaviors. For Group B, seven future behaviors were taught in approximately the same amount of time required of three nonfuture behaviors. Thus, the future condition resulted in more behaviors being learned in less instructional time.

Fourth, the addition of the instructive feedback in the consequent event resulted in more rapid acquisition (trials through criterion) of those behaviors when they were subsequently instructed. Future behaviors required 77% of the trials required of nonfuture behaviors.

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